PATENT
SOHMEI.NIPPONSHEETGLASS.PT1

REMARKS

I. STATUS OF SPECIFICATION

The Specification has been amended to correct the typographical error contained in the original Specification (see item 1d above) and the first Preliminary Amendment filed with the Application on August 11, 2001 (see items 1a-c above), without adding new matter.

The above-discussed amendments and remarks are believed to place the claims of the present Application in a proper condition for allowance. Should the Examiner have any questions regarding the above amendments, the Examiner is requested to telephone Applicant's representative at the number listed below.

PATENT
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VERSION WITH MARKINGS TO SHOW CHANGES MADE

Immediately following this page are pages 39, 45, 51, and 52 of the original application, with markings to show changes made by this amendment.

There were mixed 32.0 g of a first silica fine particle dispersion ("SNOWTEX OL" by Nissan Chemical Co., Ltd., mean particle size: 50 nm, solid portion: 20%) and 8.0 g of a second silica fine particle dispersion ("SEAHOSTAR KE-W30" by Nippon Shokubai Co., Ltd., mean particle size: 300 nm, particle size standard deviation: 1.1, average ratio of long axis length to short axis length: 1.02, solid portion: 20%) at a proportion of 4:1 in terms of solid ratio, to obtain 40.0 g of a silica fine particle dispersion (mean particle size: 50 nm, almost equivalent to mean particle size of first silica fine particles). After then adding 52.6 g of ethanol, 0.5 g of 3 mole/L hydrochloric acid and 6.9 g of tetraethoxysilane, the mixture was reacted for 12 hours to prepare a coating solution. The coating solution was spin coated onto the surface of a colorless transparent (clear) 4.0 mm thick float glass base substrate having a composition of soda lime silicate glass (visible light transmittance Ya = 88.5%, total light transmittance = 88.5%, sunlight transmittance Tg = 79.6%, ultraviolet transmittance Tuv(iso) = 52.0%, visible light reflectivity = 7.7%, Hunter color coordinate transmitted color L = 94.3[-], a = -1.7, b = 0.2, reflected color L = 27.8, a = -0.5, b = -0.6), and then held for 10 minutes in an electric oven at 500°C, to obtain a low reflection glass sheet coated with a low reflection film (average film thickness: 250 nm) having a haze value of 5.1%.

[Example 7]

While stirring 40 g of a silica fine particle dispersion ("KE-W50" by Nippon Shokubai Co., Ltd., mean particle size: 550 nm, particle size standard deviation: 1.1, average ratio of long axis length to short axis length: 1.02, solid portion: 20%), there were added thereto 52.1 g of

In Examples 6 to 10, the changes in the film reflectivities 1 and 2 and the reflection color tones were within the measuring error ranges for the spectrophotometer, and no change was found in the optical thickness. After the fastness test, the haze values increase slightly, but the total light transmittances were virtually unchanged, and therefore since there was no decrease in diffused transmitted light due to scattering of light by the fine particles, this demonstrated that the fine particles had adhered firmly to the glass base substrates.

[Comparative Example 1]

After adding 45 g of ethanol, 8.67 g of tetraethoxysilane and 1 g of concentrated hydrochloric acid in that order to 12.5 g of a silica fine particle dispersion ("SNOWTEX OL" by Nissan Chemical Co., mean particle size: 50 nm, solid portion: 20%), the mixture was stirred for 24 hours for hydrolysis reaction. This was further diluted with ethylcellosolve to obtain a coating solution (containing silica fine particles and ethyl silicate in a weight ratio of [4]1:1 in terms of silica).

[Comparative Example 2]

After mixing 36.8 g of ethanol and 7.2 g of 3 mole/L hydrochloric acid to 15.2 g of tetramethoxysilane, the mixture was reacted for 12 hours to hydrolyze the tetramethoxysilane. This hydrolyzed solution was then mixed with 160 g of a linear(chain-like) aggregated silica fine particle dispersion ("SNOWTEX-OUP" by Nissan Chemical Co., mean primary particle size: 25 nm, solid portion: 15%) to prepare a coating

#100 polishing sand to prepare surface-roughened frosted glass. The haze value and total light transmittance of the frosted glass were measured with a haze meter. The haze value was 82.6% and the total light transmittance was 75.4%. The mechanical strength of the frosted glass fell to about 40% of the original glass strength.

[Comparative Example 9]

Frosted glass was prepared in the same manner as Comparative Example [6]8 except that #1000 polishing sand was used instead of the #100 polishing sand in Comparative Example 8, and the haze value and total light transmittance thereof were measured. The haze value was 81.4% and the total light transmittance was 83.0%. The mechanical strength of the frosted glass fell to about 50% of the original glass strength.

Industrial Applicability

According to the present invention, a coating solution obtained by hydrolysis of a hydrolyzable metal compound in the presence of silica fine particles is used, with relatively large silica fine particles or with a specified proportion of silica fine particles and binder, to obtain much lower reflectivity and high film strength, while improving contamination removal and eliminating changes in reflectivity with time.

Also according to the present invention, warping of the glass due to film contraction is completely eliminated even when the glass base substrate is heated at above the softening temperature. This is because the film is composed of mainly silica fine particles that undergo

almost no contraction, and therefore the bond between the film and glass is reduced and the contact between the particles is minimal. Particularly in the case of a film obtained by co-hydrolysis, the binder concentration on the surfaces of the silica fine particles increases, such that the binder forms no film on the glass base substrate surface and the contraction force of the binder does not act as easily on the glass. Consequently, even with formation into a curved shape such as for automobile glass, for example, the same working may be carried out as for film-free glass, and production costs may therefore be reduced. It is suitable also for uses such as solar cell base substrates and building windows as well, since the flatness of the glass can be maintained even when high temperature treatment is carried out for enhanced film strength.

Also according to the present invention, the uppermost surface of the low reflection glass has an irregular shape, so that the hydrophilicity of the silicon dioxide is improved and the glass surface is more resistant to [clouding]fogging by moisture adhesion. Even when water droplets adhere, the contact angle is small and the surface is highly hydrophilic, and therefore contamination such as dust is easily washed off. Since the water droplets do not easily remain, the glass has a contamination resistant property whereby contamination such as water tracks are less prone to form on the surface.

A single layer low reflection film according to the invention not only is less costly to manufacture than a multilayer film, but its reflectivity performance also provides lower reflection across a wide wavelength range and less increase in reflectivity with respect to the

PATENT
SOHMEI.NIPPONSHEETGLASS.PT1

Respectfully submitted,

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